

Paved Shoulders

Paved shoulders offer increased safety by reducing run-off-the-road crashes. In addition, they offer maintenance benefits by reducing edge rut and associated shoulder repairs. Paved shoulders also better accommodate bicyclists by providing an area for them to ride on that is off of the mainline of the roadway. The purpose of this section is to inform designers when paved shoulders should be included and what Standard Road Plans and Road Design Details apply.

Sizing and Placing Paved Shoulders

Review of projects on a project by project basis should consider the following design factors as guidelines. The final decision is left up to each District based on the features discussed below. The major decision is whether to use full paved shoulders or partial paved shoulders and the width of the shoulders. This section offers assistance with issues to consider in that selection.

Full Width Paved Shoulders (Standard Road Plan [RJ-33](#), [RH-41A](#), [RH-41B](#), [RH-41C](#), [RH-42](#)) are placed:

- On all interstates.
- On the inside and outside of curves greater than 6 Degrees.
- Along roadways near metropolitan areas where you expect a considerable amount of pedestrian and bike traffic or turning traffic into rural acreages and subdivisions.
- When a designated bike trail is routed along the roadway.

Six Foot Wide Paved Shoulders (Standard Road Plans [RJ-33](#), [RJ34](#), [RH-41A](#), [RH-41B](#), [RH-41C](#), [RH-42](#)) are placed:

- Where no shoulder rumble strip is installed due to noise concerns. This would be appropriate on roadways as you approach an urban area and there is considerable rural subdivision development.
- On two lane roadways with an existing ADT greater than 5000 vpd.
- On all urban expressways
- On rural expressways with an existing ADT greater than 10,000 vpd.

Four Foot Wide Paved Shoulders (Standard Road Plan [RJ-33](#), [RJ34](#), [RH-41A](#), [RH-41B](#), [RH-41C](#), [RH-42](#))

- Four-foot (1.2-meter) paved shoulders should be included on all NHS highways not using full width or 6 foot shoulders.
- Projects on non-NHS highways with a current year ADT of 3000 or more.

For non-NHS highways with current year ADT of less than 3000, a combination of other factors such as those listed below needs to be considered to determine if paved shoulders are appropriate:

- Design year ADT: even if current year ADT doesn't warrant paved shoulders, design year ADT may be high enough that the designer should consider paved shoulders.
- Run-off-the-road crash rate: paved shoulders should be considered for segments of roadway that exhibit a high run-off-the-road crash rate.
- Horizontal and vertical alignment: paved shoulders should be considered for segments of roadway with a high number of horizontal curves – paved shoulders can reduce problems associated with off-tracking. Segments of road with steep grades should also receive consideration for paved shoulders, as storm runoff can cause erosion of shoulder rock on steep grades.
- High truck volumes: segments of roadway that carry high truck volumes may be candidates for paved shoulders.
- Maintenance issues: paved shoulders should also be considered for segments of roadway that experience continuing problems with edge rut.
- Shoulder width continuity: continuity of paved shoulder width is desirable along segments of a corridor.
- Rumble strips: rumble strips are normally not placed on paved shoulders less than four feet wide.
- Multiple widening units: consider how many times the pavement has been or may be widened. Multiple narrow widening units are undesirable – they can create an uneven surface and lead to additional maintenance. Paved shoulders may be more appropriate.
- Cost differential: the cost for four-foot paved shoulders is only slightly more than for pavement widening. The safety benefits of paved shoulders may outweigh the extra cost.
- Bicycle accommodation: if bicycle accommodation is warranted, minimum four-foot shoulders are recommended.

If a determination is made not to include paved shoulders on a non-NHS route, two-foot pavement widening will likely need to be included. See Section [7D-8](#) of this manual for guidance on pavement widening.

Paved Shoulders and Bicycle Accommodation

The designer should work with the District Office to determine if wider paved shoulders are warranted for bicycle accommodation, for example, six-foot paved shoulders on state highways within the statewide trail corridors. This evaluation should be based upon the bicycle accommodation guidance available from the Office of Systems Planning. If wider shoulders are warranted, local government funding may be required per the bicycle accommodation guidance.

New Construction or Reconstruction

Standard Road Plan [RJ-34](#) and Road Design Detail [7153](#) should be used for partially paved shoulders on new construction or reconstruction projects for expressways and two-lane highways. Standard Road Plans [RJ-33](#), [RH-41A](#), [RH-41B](#), [RH-41C](#), [RH-42](#) and Road Design Details [7115](#), [7116](#), [7119](#), [7125](#), and [7126](#) should be used for fully paved shoulders.

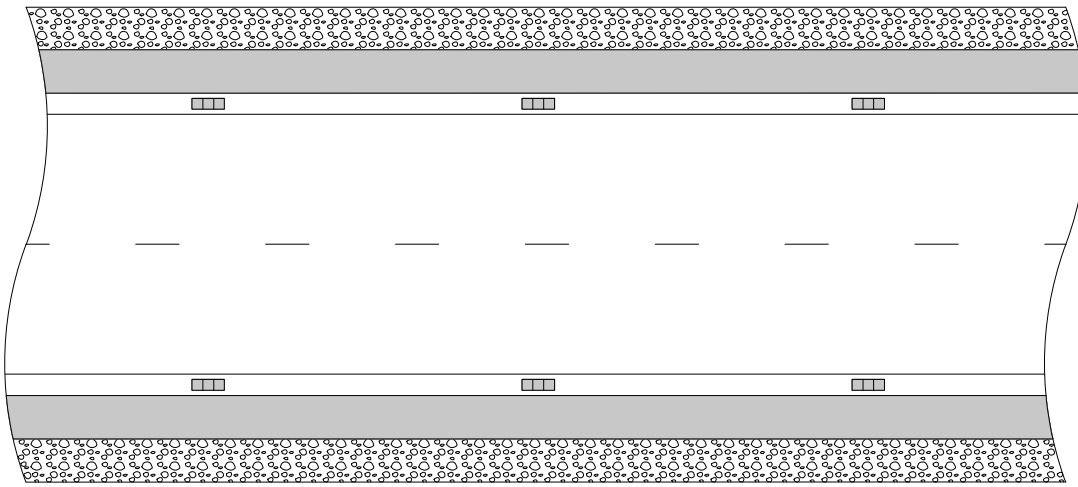


Figure 1: Paved shoulders for new construction or reconstruction. The milled shoulder rumble strips are not shown in this figure.

Retrofitting Paved Shoulders

Road Design Details [7151](#) should be used for retrofitting paved shoulders on resurfacing projects. Road Design Detail [7152](#) should be used if the project does not involve resurfacing.

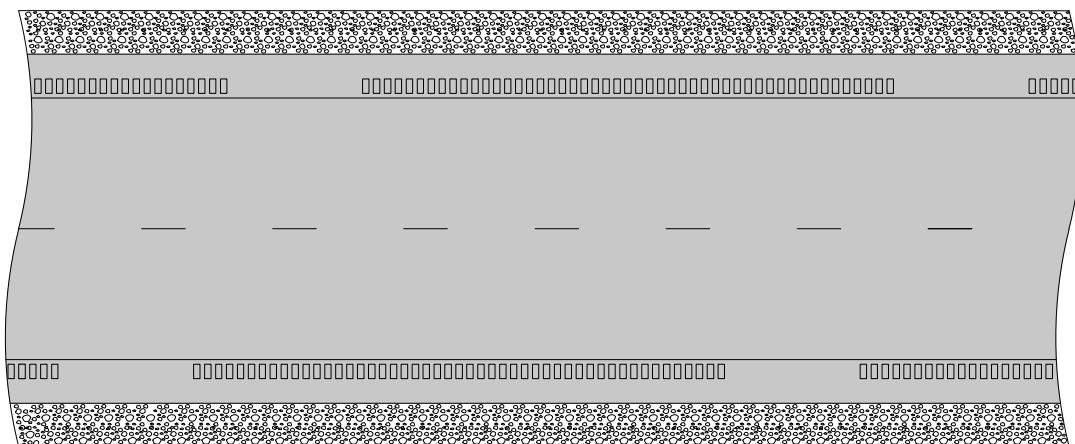


Figure 2: Retrofit paved shoulders.

Bridge Replacement Projects

Normally, four-foot paved shoulders will not be placed with bridge replacement projects. If the replacement project also involves realignment, then paved shoulders should be considered.

Special Situations

Designers may encounter two situations in particular with 3R projects: pavements that are less than 24 feet (7.2 meters) wide, and retrofitting paved shoulders where less than six feet (1.8 meters) of shoulder is available.

Retrofitting Paved Shoulders with Pavements Less Than 24 feet (7.2 meters) Wide

If a designer encounters a situation where a highway pavement is less than 24 feet (7.2 meters) wide and the highway meets the qualifications stated above for paved shoulders, he or she should contact the Pavement Design Section in the Office of Design for assistance.

Retrofitting Paved Shoulders where Less Than Six Feet (1.8 meters) of Shoulder Is Available

A minimum two-foot (0.6-meter) granular shoulder should be placed outside of a paved shoulder for pavement support and delineation. This is not possible if a four-foot (1.2-meter) paved shoulder is to be placed where less than six feet (1.8 meters) of shoulder is available. One option is to widen the shoulder to accommodate a four-foot (1.2-meter) paved shoulder with a two-foot (0.6-meter) granular shoulder. A second option is to reduce the width of both the paved and granular portions of the shoulder. The width of the paved portion of the shoulder (E) is determined as shown in Figure 3.

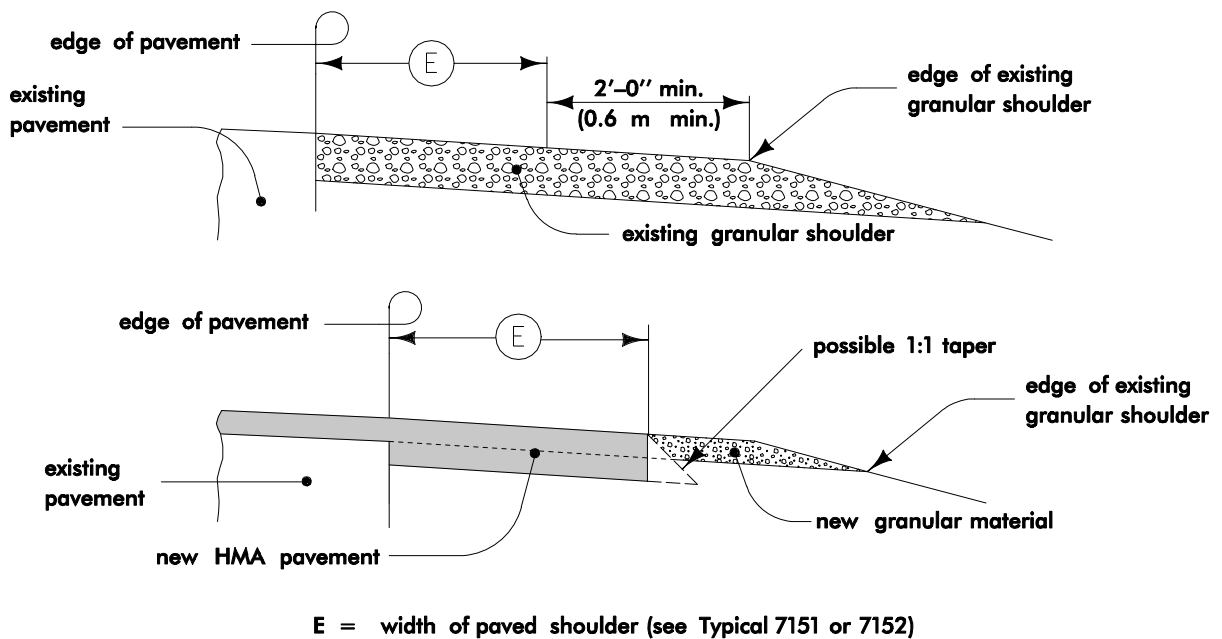


Figure 3: E is determined by measuring in 2 feet (0.6 meters) from the edge of the existing shoulder.

Designers are likely to encounter other situations which are not covered in this section or do not fit well with existing Standard Road Plans and Road Design Details. In cases such as these, the designer is encouraged to contact the Methods Section in the Office of Design for assistance.

Returns and Tapers

Road Design Detail [7154](#) should be used for returns at intersections. Road Design Details [7154](#) and [7155](#) should be used at tapers for auxiliary lanes. Road Design Detail [7154](#) is used for turning lanes and [7155](#) is used for passing and climbing lanes.

Milled Rumble Strips

Milled rumble strips should be placed according to Section [3C-5](#) of this manual. A gapped pattern should be used on all highways where bicyclists are legally allowed.